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Class Size and Pupil-Teacher-Ratio:
Exploring the Myths

An examination of research into reduced class size and PTR's
and the effects on student achievement.
Prepared for Alberta Education

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Class Size and Pupil-Teacher-Ratio: **Exploring the Myths**

No topic in education has served to capture public and professional attention as the issue of class size and pupil-teacher-ratios. Nor is it surprising that parents and teachers would seek to embrace the notion of students receiving as personal an education as possible. Increasing student achievement is the hope of educators and parents alike and common sense dictates that the more time a teacher has available for each student, the more each student will be trained for success. The high costs involved in reducing class sizes and PTR's are of little concern when considering the future of our children. This mindset, of reducing class size at all costs in order to facilitate increased student achievement, has taken hold of the education community to the extent that the desirability of reduced class size is no longer put into question. Even the outcry for increased funding into education has not diminished faith in reducing class size and PTR's, the most expensive course of action available. The benefits of the implementation are believed to justify the cost.

What the education community and the Alberta Teachers' Association have not recognized however, is the strong evidence indicating that significant increases in student achievement are not realized unless class sizes fall to 17 students or lower. Reducing a class size to 22 or 23 students will not have a measurable effect other than high expenditure rates. The marginal increases in student achievement which arise from very small classes can be achieved more effectively and cheaply through other measures, most notably in areas of teacher quality. These assertions have been borne out in countless research studies and even the deeply-flawed Tennessee STAR project, which educators often cite as support for reduced class size, does not give evidence of any benefits created by small classrooms beyond kindergarten. The bottom line is that diminishing class size is a high-cost, low-return investment, and one which does not serve to alleviate difficulties within the education system. Moderate decreases in class size do not alter achievement and large reductions are neither cost effective nor proven to generate results.

There are simply better ways to spend the education dollar when it comes to improving the system and research demonstrates that class size and PTR are not indicators of quality instruction.

For every study which exists to substantiate class size and PTR reductions, there is an opposing study that demonstrates negligible and even negative effects on student achievement. Even studies which demonstrate positive effects are unable to justify the cost involved in implementing a state or province-wide program of class size reduction. At the very least, the strong uncertainty over the effectiveness of reduced class size should cause the Alberta Teachers' Association to review its stance on the issue.

Current research indicates that reducing class size boosts costs dramatically without a matching boost in academic performance.

-Robert C. Leonardi, President of the Buckeye Institute for Public Policy Solutions

You have to go way, way down to get gains that are appreciable, that would even be noticeable to a teacher.

-Robert Greene, The Associated Press

While policies to reduce class size may enjoy popular political appeal, such policies are very expensive and, according to the evidence, quite ineffective.

-Eric A. Hanushek, University of Rochester

Without question, PTR's have fallen steadily throughout the twentieth century and yet student achievement has not responded accordingly. According to Eric A. Hanushek, a leading authority on school economics, PTR's fell 35% between 1950 and 1994 and yet students in 1970 (the earliest statistics available) performed as well as students in the mid-1990's. Econometric evidence, which relates teacher intensity to measures of student performance, has been incredibly unsupportive of class size reductions. There are 277 econometric studies that consider PTR and only 15% of the studies find a positive and statistically significant relationship between PTR and student achievement; 13% actually reveal a negative relationship. Restricting attention to the best of these 277 studies (those which employed the most accurate testing methods such as a single-state focus), only 1 out of 23 shows smaller class size to have positive effects. Further research from the State of Ohio reveals that, while PTR's had been reduced by 22% and class

sizes had 4 fewer students in 1997 than in 1978, overall test scores had not improved and graduation rates had actually declined. International data also portrays PTR and class size as inconsequential as wide variations in class size policy produce negligible effects on achievement. Six international tests in math and science from 70 countries with diverse PTR's and class sizes showed little disparity in student performance. Japan, which has much larger class sizes than the United States (although similar PTR's), outperforms the US in student achievement. The research studies which demonstrate positive results in student performance are neither impressive enough to warrant the expenditure involved and nor are the results exclusive to the method of class size reduction.¹

Supporters of class size reduction address contradictory research evidence with the Tennessee STAR (Student/Teacher Achievement Ratio) project from the mid-1980's, which has become the definitive study in class size experimentation. The findings of the project have served as justification for class size reductions of any sort and at all levels, even though the project was very specific in its boundaries and in its results. The experiment attempted to study the effects of class size through a random-selection process that was large in its undertaking and admirable in its intent, but several flaws emerged in the design and implementation of the project which have only recently been addressed. Popular interpretations of the STAR results are not supported by the data and even when the results are taken at face value, it becomes clear that positive effects of small class size are demonstrated only at the kindergarten level and then only marginally. Because of the ambiguity of the effects of class size, the State of Tennessee launched the experiment based on prior research that had ascertained that class levels of 15 or lower resulted in improved performance (Glass and Smith, 1979). Project STAR was very large and complicated; researchers followed kindergartners through third graders who were randomly assigned to three groups: regular classes (22 to 24 students), regular classes with a teacher's aide,

¹ Statistics on PTR rates, econometric evidence and international data are taken from *The Evidence on Class Size*, by Eric A. Hanushek. (Occasional Paper Number 98-1, W. Allen Wallis Institute of Political Economy, University of Rochester).

and small classes (14-16 students). 7000 students in 79 schools participated in the experiment. On average, students in both groups of regular classes performed similarly throughout the experiment while the small classes group made significant advances at the kindergarten level which carried over into successive years. Small kindergarten classrooms outperformed regular classrooms in 40 out of 79 schools. There was no widening of achievement in the years following kindergarten to suggest that the small class group had an advantage over the regular class groups. The STAR data did not indicate that wholesale reduction of class sizes at any grade level was justified or even desirable. In fact, the flaws in design and implementation suggest that the evidence found in support of reduced class sizes in kindergarten might even be discounted:

- Since kindergarten was not mandatory or universal, not all students entered the experiment at the same time.

- Sizable attrition, that was not random, occurred over the course of the experiment.

Those students leaving the experiment in the first grade had below average achievement while in kindergarten. The disparity in achievement was even more pronounced in the final year between those students leaving the experiment and those remaining.

- Significant movement between groups is also recorded (6% of students transferred) with most students leaving the regular classes for the smaller ones. Since the experiment was not blind and everyone knew that small class size was being tested, it is likely that parents pressured principals to have students placed in the smaller classes. Each teacher was aware of their role in the experiment leaving the results open to teacher bias in favor of small class sizes. It is plausible to assume as well that preferences for assignment to different classes was taken into consideration, upsetting the random quality of teachers.

- Of the initial experimental group starting in kindergarten, only 48% remained in the project the entire 4 years.

- 5276 new students were added at various stages and levels, none were pre-tested upon entry and nor were achievement tests administered before entry into kindergarten.

-4 schools did not remain in the experiment for the full 4 years; the reasons for their withdrawal were not given.

-3-12% of students in the experiment were not tested in each year.

-The data from the experiment has not been generally available to researchers, even though major policy decisions are made on the basis of that data.

It is interesting to note that the STAR project has never been duplicated with cost cited as the obvious deterrent. The importance of new research on class size is evident however, when considering the flaws existent in the project which had served to create an overall bias in favor of finding benefits of small class sizes. This becomes especially clear when considering that, while the Tennessee STAR project cost \$12 million to implement (\$16 million in 1996 prices), the statewide reduction in class size for K-3 in California costs the state in excess of \$1 billion each year. Until new research is conducted, educators and parents will continue to cite the positive effects of the STAR project, aware of neither the minimal nature of the effects nor of flaws in the experimental design. Legislators will implement costly class-size reductions which serve only to deprive the system of much-needed funds without any corresponding benefits in student achievement.²

Of course, if the class size reductions are viewed more as policies with political rather than educational objectives, it is perhaps the case that policy makers do not want to know whether there are performance improvements. -Eric A. Hanushek

That smaller class sizes have been proven generally ineffective in increasing student achievement, is no doubt difficult for teachers and parents to digest. Common sense, conventional wisdom and highly publicized accounts of scientific research, have made the issue of class size and PTR a convenient policy instrument. But consider the example of a class size reduction from 26 to 23 students, a policy which would represent an increase in teacher costs

² Information on Tennessee STAR project taken from the *Student/Teacher Achievement Ratio, Tennessee's K-3 Class Size Study, Final Summary Report*, and from *Some Findings from the Tennessee STAR Experiment and Other Investigations of Class Size Reductions*, by Eric A. Hanushek, University of Rochester.

alone of over 10%. Would the teacher notice the reduction in workload and would the teaching style be altered to allow for more individual attention? Research studies suggest that teachers do not modify their teaching habits to capitalize on any benefits of reduced class size, especially when the reductions involve only a few students. Nor does a reduction in the number of students decrease teacher workload, as an instructor may then be assigned to teach additional classes. Quite simply, teacher quality is the greatest indicator of classroom achievement, as an inefficient teacher remains inefficient whether in front of a class of 20 or 30. Diminishing class sizes and PTR's appears to be an easy, across-the-board solution, as innovations in teacher quality are difficult to effect and to measure. The benefits of improved teacher quality, however, far outweigh any achieved through smaller class sizes and, oddly enough, reducing PTR's and class sizes calls for the hiring of new teachers that can be of higher quality, thereby elevating student achievement quite independently of the smaller class size.

How much difference does a small class size make compared to other changes which could be implemented at far less expense? The State of California spent \$488 million to lower class sizes to 20 in kindergarten through to grade three. It is interesting that California legislators justified the expense based upon the Tennessee STAR project which itself demonstrates that class size needs to be 15 or lower to generate any measurable success. The State of Tennessee has in fact maintained small classes in only 17 districts out of a total 139. Fiscal realities place limitations on how small a classroom can be and only marginal reductions can generally be made, reductions which, although small in scope, nonetheless have a large effect on an education budget. The effectiveness of small decreases in the number of students has been put into question, thereby forcing educators and the Alberta Teachers' Association to consider whether the costs are justified. There are clear limits to the amount of money available to school districts and, given the value that teachers and parents place on quality education, there is no doubt that the massive costs involved in reducing classes by 3 or 4 students, a measure proven ineffective, could be put to better use. One-on-one tutoring which guarantees individual attention for students is much more cost effective and has proven results. Cross-age reading

groups, peer tutoring and cooperative learning are also suggested as effective measures that can be taken to ensure that students are receiving the attention they need. Squandering public and political attention, not to mention education dollars, on the ineffective measure of reducing class size serves only to reinforce existing problems.³

It is likely that parents and teachers will continue to press for smaller classes, even when such classes (shrunk to 20 or a few more) are highly unlikely to demonstrably benefit students academically. It is equally likely that they will continue to be far less aware of, and interested in, the alternatives, including individual and small group tutoring, which show greater payoff. The intuitive appeal of smaller classes, even just a little smaller, has so far proved well-nigh irresistible in spite of decades of consistent empirical findings to the contrary.

-Suzanne Ziegler

The Alberta Teachers' Association has long-embraced the idea of reduced class size out of 'common sense' notions and concern for individualized attention in the classroom. Extensive research does not support the idea of increased quality time for students and teachers in smaller classrooms, rather, teacher quality emerges as the strongest factor in a student's achievement. Investigation into the effects of reduced class size and PTR's has been consistent in that a negligible effect has been demonstrated, one which can be positive, but only in the case of extremely small classes. Any improvements in student performance that smaller class sizes produce, can be achieved more effectively and cheaply through other reform measures. It is time for the education community to move past issues of class size and PTR that are insignificant in their implications for student achievement.

³ Information on alternative initiatives to increase student performance taken from *Class Size, Academic Achievement and Public Policy*, Suzanne Ziegler (CEA).

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